

REPORT DOCUMENTATION PAGE

AFRL-SR-BL-TR-98-

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork

0046

wing
ation

| | | | |
|--|---|--|---|
| 1. AGENCY USE ONLY (Leave blank) | | 2. REPORT DATE 30 Aug 97 | 3. REPORT Final Tech Report, 01 Jul 96 - 28 Feb 97 |
| 4. TITLE AND SUBTITLE Validation of Base Resource and Capabilities Estimation | | | 5. FUNDING NUMBERS F49620-96-1-0332 |
| 6. AUTHOR(S) Prof. Ervin Y. Rodin | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Center for Optimization and Semantic Control Dept of Systems Science and Mathematics, Campus Box 1040 Washington University St. Louis MO 63130-4899 | | | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR/NM 110 Duncan Avenue Suite B115 Bolling AFB DC 20332-8050 | | | 10. SPONSORING/MONITORING AGENCY REPORT NUMBER |
| 11. SUPPLEMENTARY NOTES | | | |
| 12a. DISTRIBUTION AVAILABILITY STATEMENT Distribution Unlimited. | | | 12b. DISTRIBUTION CODE |
| 13. ABSTRACT (Maximum 200 words) Time delay models for pallet movement operations have been developed and implemented in BRACE. These have resulted in a significant decrease in computation time for simulation. <div style="text-align: center; font-size: 2em; font-weight: bold;">19980116 049</div> <div style="text-align: center; font-weight: bold;">DTIC QUALITY INSPECTED 8</div> | | | |
| 14. SUBJECT TERMS Optimization, semantic control. | | | 15. NUMBER OF PAGES 3 |
| | | | 16. PRICE CODE |
| 17. SECURITY CLASSIFICATION OF REPORT Unclassified | 18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified | 19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified | 20. LIMITATION OF ABSTRACT UL |

Accepted
S/R
NRG

PROGRESS REPORT
(October 1, 1996-September 30, 1997)

Submitted to
Air Force Office of Scientific Research
Building 410, Bolling AFB, DC 20332

by

Ervin Y. Rodin, P.I.
Professor and Director

Center for Optimization and Semantic Control
Department of Systems Science and Mathematics
Campus Box 1040, Washington University
One Brookings Drive
St. Louis, MO 63130-4899

in connection with

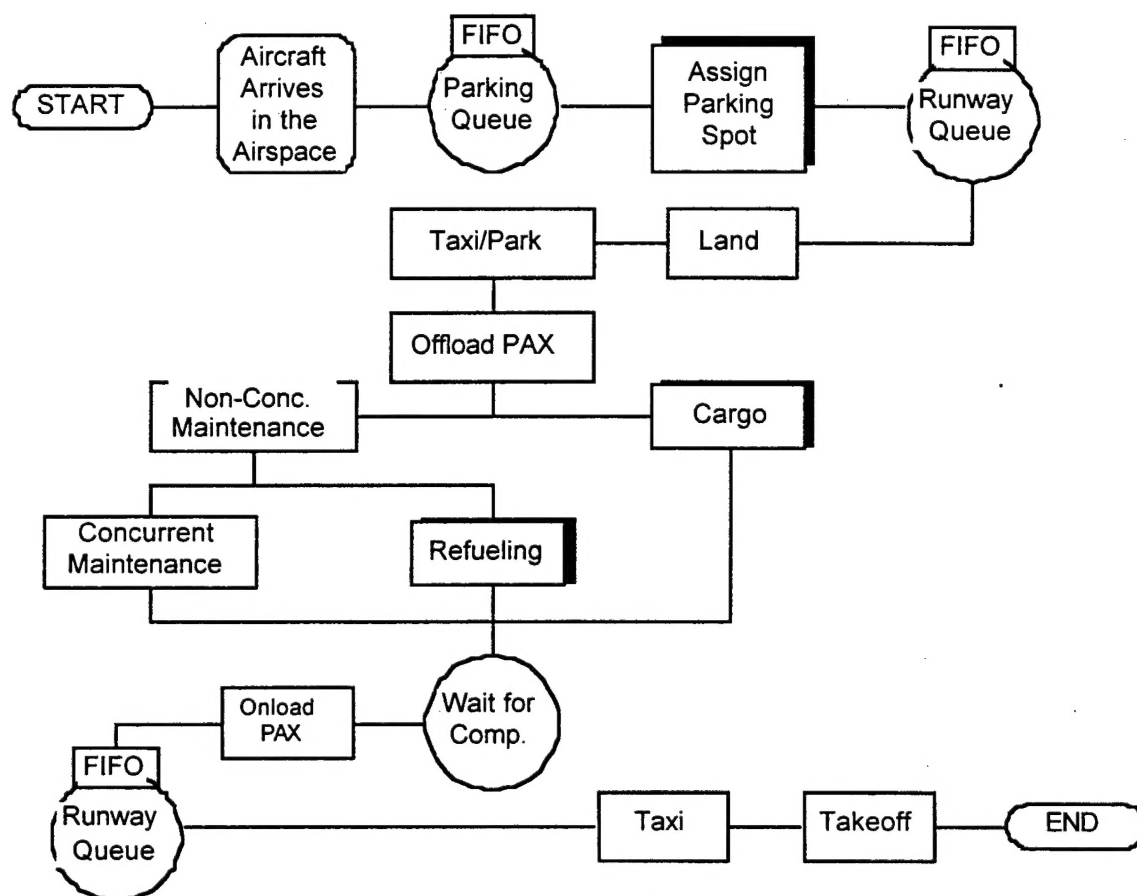
Grant AFOSR F49620-96-1-0332

**VALIDATION OF BASE RESOURCE AND CAPABILITIES ESTIMATION
(BRACE)**

30 August, 1997

BRACE can be run with internally generated aircraft arrival streams. The simulation currently supports six types of aircraft (C-130, C-17, C-5, C-141, B-747, DC-8), each with a different set of definable cargo and fuel requirements. The user can specify any proportion of these six aircraft which will subsequently be chosen by use of a uniform random variable. The inter-arrival times between aircraft can be drawn from either an exponential or triangular distribution with user-specified parameters.

AIRCRAFT SERVICE SCHEDULE: Each aircraft simulated in BRACE follows a schedule of activities which require interaction between the various resources provided by the airfield. From the aircraft point of view, every activity during the simulation is analogous to waiting in a queue for an available server and subsequently obtaining service from an airfield resource. The following chart outlines the possible service requirements in the proper sequence.



When an aircraft arrives in the simulation, it enters a first in first out (FIFO) queue which assigns parking spots to aircraft. After being assigned a parking spot, the aircraft requests use of the runway and waits in a FIFO queue until the runway resource becomes available. After the aircraft lands,

it taxis to the assigned parking spot where it will receive service from the airfield resources.

Simulation Results: A simulated pallet movement operation requires the coordination of aircraft, k-loaders, docks, and forklifts which clear pallets from the docks to the cargo yard. Replacing the entire movement operation with the time delay models, developed during the last year, results in a significant decrease in computational time for the simulation. In one test case where each aircraft required five k-loader loads of pallets, a 500 aircraft simulation ran faster by a factor of eight with the time delay function replacing the pallet on-load part of the simulation. The equations developed accurately capture the time delay as seen by an aircraft for loading and fueling service at an airfield.

5. PERSONNEL ASSOCIATED WITH THIS RESEARCH

Faculty:

Professor Ervin Y. Rodin (PI)

Graduate Student:

Travis Cusick

6. PUBLICATIONS

None as yet

7. INTERACTIONS/TRANSITIONS

Joint development with HQ/AMC at Scott AFB.

"The Base Resource and Capabilities Estimation (BRACE) Project,"
Presentation at the Mobility Simulation Users' Group Workshop,
Daytona Beach, Florida, March 1997

8. NEW DISCOVERIES, INVENTIONS OR PATENT DISCLOSURES

None

9. HONORS/AWARDS

None